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THE HUMAN SIDE OF THE  
BERLIN AIRLIFT

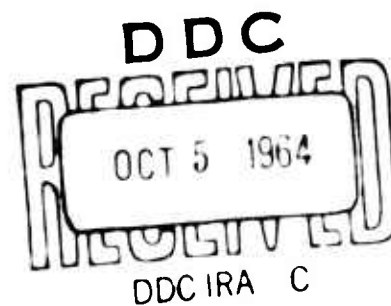
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Review. It is a by-product of the  
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blockade and airlift.

The Berlin airlift of 1948-1949 has been widely recognized as a masterpiece of both improvisation and organization. When the Soviets completely severed land communications between Berlin and West Germany in the last days of June 1948, British and American aircraft were suddenly called upon to supply all the necessities of life to nearly two and a half million persons in the beleaguered city. This feat was accomplished with a speed and efficiency that caused many observers to label it a technical miracle. During July 1948, with almost no advance preparation for a large-scale operation, the Western powers were able to fly in an average of somewhat over 2,000 tons per day. This figure rose steadily, although with fluctuations caused by bad weather, and by April 1949 more than 8,000 tons per day were arriving in West Berlin via the airlift.

Considerable attention has been given the technical lessons learned from the Berlin airlift, especially in regard to aircraft and air space utilization, training procedures, cargo handling, and so on. Less attention has been given the human factors involved in the airlift's operations, although these were certainly no less important to its success or failure than were the material and organizations aspects.

The following pages are devoted to a discussion of some of these human factors: the importance of enthusiasm as a spur to improvisation, the way in which a clear definition of the mission helped ensure coordination among the numerous agencies concerned, the strains that the grueling pace of the operation placed on the morale of air crews, the compensating motivations that combined to ensure high performance in spite of these strains, and the spontaneous contributions to good public relations made by individuals who took part in the airlift.<sup>1</sup>

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1. This article is a by-product of a larger study of the political and psychological aspects of the Berlin blockade and airlift undertaken by The Rand Corporation and published by the Princeton University Press in 1958 under the title: The Berlin Blockade - A Case Study in Cold War Conflict. Observations made here are based on interviews with personnel who were involved in the operation of the airlift, both Allied and German, as well as on published sources.

For information on the technical lessons learned from the airlift, see especially: Berlin Airlift - A USAFE Summary, published by Hq. U.S. Air Force, Europe, 1949; "A Special Study of Operation 'Vittles'," published by Aviations Operations Magazine, April, 1949, Berlin Airlift: An Account of the British Contribution, prepared by the Air Ministry and the Central Office of Information, with text by Dudley Barker, H.M. Stationery Office, London, 1949; A Report on the Airlift, Berlin Mission: The Operational and Internal Aspects of the Advance Element, prepared by Hq. Combined Airlift Task Force (no date), and Charles J.V. Murphy, "Berlin Air Lift," Fortune, November, 1948.

### Enthusiasm and Improvisation

On the American side, the first steps toward establishing a large-scale airlift came on June 29th, when temporary headquarters for a Berlin Airlift Task Force were set up under the command of Brigadier General Joseph Smith. General Smith was given this assignment by General Curtis LeMay, at that time commander of the U.S. Air Forces in Europe, when he stopped in at General LeMay's office "on the way back from lunch." Instructed to fly as much food as possible into Berlin, starting immediately, General Smith mobilized all available transport aircraft, manned those planes that did not have assigned crews by taking flying personnel off desk jobs in USAFE headquarters, and began transporting supplies for the Berlin civilian population on the same day. Many of the officers concerned were flying "in addition to their other duties," and suddenly found themselves working sixteen to eighteen hours out of each twenty-four. The airlift was at first expected to last at the most a few weeks, and many of the personnel concerned experienced the sudden demands on them as a lark.

British air crews of the Royal Air Force Transport Command had a similar exhilarating experience when ordered to start a large-scale airlift to Berlin. A British account

describes the operations of the first few days as having been conducted in a carefree, almost a haphazard manner:

Pilots full of doughnuts and tea went forth to seek any aircraft which happened to be fueled, serviced, and loaded. Hot was the competition, and great was the joy when one was found. Soon the summer skies were full of...aircraft heading in the general direction of Berlin.<sup>2</sup>

Much the same situation prevailed in organizations responsible for procuring supplies to be transported. Since as yet there were no provisions for moving large quantities of food to the airfields, American and British Army officials commandeered shipments of foodstuffs wherever they could find them and rushed them to the planes. German and military stocks were thus diverted to the airlift for several weeks, before a more systematic procurement system was set up.

Stories about the confusion, and also the enthusiasm, of the early days of the airlift are legion. One tells of a C-47 that was carrying an eminent diplomat on a tour around Europe. This plane landed at Wiesbaden, and the machine was left unattended while crew and passenger had lunch. When

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2. Berlin Airlift - An Account of the British Contribution, op. cit., p. 18.

they returned, they found the plane loaded with three tons of flour.<sup>3</sup>

The peculiar problems of the airlift called for considerable ingenuity, both in utilization of aircraft and airspace and on the ground. For instance, some of the heavy machinery required for airfield construction in Berlin had to be cut into manageable pieces with a blow torch before it could be flown in, and, once in Berlin, had to be welded together once more.<sup>4</sup> Again, to facilitate bad-weather landings at Tempelhof, it was necessary to construct towers of up to seventy-five feet on which to mount approach lights. After searching the city for materials, engineers decided to try and build them out of welded-steel landing mats, and the experiment worked perfectly.<sup>5</sup> New methods of cargo handling were devised, ways were found of scheduling aircraft at closer intervals than had previously been considered possible, and numerous other innovations helped speed the operation.

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3. E. J. Kahn, Jr., "A Reporter in Germany," The New Yorker, May 14, 1949.

4. Lowell Bennett, Bastion Berlin, Friedrich Rudl, Frankfurt a/M, 1951, pp. 133-134.

5. "A Special Study of Operation 'Vittles'," op. cit., p. 66.

Transportation of supplies from Berlin airfields to storage depots was accomplished largely by German civilian trucking firms under the supervision of military transport agencies, but fuel economies were effected in several ingenious ways. U.S. Military Government, for example, put into operating condition a small, privately-owned railroad extending some six miles from Tempelhof airfield to one of the city's canals, and thereby saved substantial quantities of gasoline. Two locomotives and twenty freight cars were "borrowed" from the Russians for this purpose, and were then credited against the railway-car debt that the Soviets owed the West German bizonal area.<sup>6</sup> The British, for their part, constructed a pipeline from Gatow airfield to an oil-barge loading point on Berlin's canal system. They were able to do so only because there happened to be available in Berlin some lengths from the oil pipeline that had been laid on the floor of the English Channel during the war to pump oil supplies from England to the armies on the Continent.<sup>7</sup>

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6. The New York Times, September 2, 1948.

7. Berlin Airlift: An Account of <sup>the</sup> British Contribution, op. cit., p. 53.



Those who were involved in the operation of the airlift reported that the atmosphere was favorable to ingenuity and improvisation. The emphasis was on getting the job done rather than doing it according to the book. Although this emphasis was sparked by the speed and enthusiasm with which the undertaking was launched, some of it persisted to the very end. Anticipated bottlenecks again and again failed to materialize, and the airlift broke its own records week after week. The atmosphere was summarized by a U S. Air Force officer who was trying to explain the success of the airlift to an inquiring reporter: "...if you run across anyone in the theater who tells you that he knew we could do it all the time, pass him up. We didn't know all the answers all the time. We kind of astounded ourselves."<sup>8</sup>

#### Definition of Mission as an Aid to Coordination

Successful operation of the airlift required not only smooth teamwork within the American and British Air Forces, and between the two, but also coordination among French, British, and American Military Governments, Berlin's German officials, and civilian agencies in West Germany. All these

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8. Major Edward Willerford, quoted in "Berlin Airlift," a special issue of The Bee Hive, published by the United Aircraft Corporation, East Hartford, Conn., Fall, 1948, p. 9.

authorities played a vital role in assuring the supply of West Berlin and without full co-operation from all of them the success of the mission would have been in doubt.

Furthermore, since many of the agencies that played a vital role in assuring Berlin's supply did this in addition to many other functions, it was impossible to place all of them under a single command. Coordination was ensured in part through a complicated network of air-ground, inter-Allied, and Allied-German committees, but even more by the fact that all those concerned understood the mission to be accomplished and appreciated its importance and urgency. When U.S. airlift units first started using airbase facilities in the British zone of Germany, for instance, it was found that certain vital supplies had not yet been brought forward from the U.S. zone. The British immediately furnished the necessary supplies, in spite of the absence of any agreement calling on them to do so. Similarly, Army personnel diverted supplies that had been allocated for other purposes and shipped them to West German airfields in order to maintain an adequate flow, and German officials cheerfully cut across formal administrative channels to help both in planning requirements and distributing supplies.

All of these arrangements might very well have necessitated time-consuming negotiations and conferences. That such negotiations ordinarily were not necessary was due in large part to the fact that the significance of the airlift was clearly understood by all personnel concerned at all echelons. As a German supervisor at Rhein/Main airbase said afterwards with reference to the performance of his maintenance crew: "We didn't have to explain to the men the importance of what they were doing; this they saw every day in the newspaper."

The experience of the airlift thus suggests that a clear definition of objective, which is understood by all personnel, may on occasion do as much to ensure good coordination as a streamlined organizational set-up.

#### The Strain of the Long Haul

On October 20, 1948, the British and American units engaged in the airlift were brought under the direction of a Combined Airlift Task Force, with Major General William H. Tunner as commander and Air Commodore J.W.F. Merer as deputy.

General Tunner recognized that the airlift's success might depend on whether minutes, or even seconds, could be shaved off the time necessary to perform each individual operation. This called for clock-like, standardized efficiency at all the air bases involved. In General Tunner's own words:

The basic concept of the lift was to pace the entire procedure to a steady, even rhythm with hundreds of planes doing exactly the same thing every hour, day and night, at the same persistent beat.<sup>9</sup>

The soundness of this concept was clearly demonstrated by the results achieved during the ensuing ten months.

Maintenance of this steady rhythm over a longer period, while it ensured optimum utilization of available equipment and air space, imposed serious strains on personnel, and morale problems were inevitable. Some of these were caused by physical and mental fatigue, others were brought on by inadequate base facilities, uncertainty about the length of time the operation would continue, and domestic worries.

Soon after the novelty of the airlift wore off, fatigue began to be reported. Table 1 shows the major causes of fatigue as reported by British aircrews in a study conducted by medical authorities.

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9. Major General William H. Tunner, "Technology or Manpower," Air University Quarterly Review, Fall, 1952, pp. 6 and 8.

TABLE 1

MAJOR CAUSES OF FATIGUE REPORTED BY BRITISH AIRCREWS  
IN RESPONSE TO A MEDICAL QUESTIONNAIRE<sup>10</sup>

<u>Problem</u>	<u>Per Cent Mentioning*</u>
Lack of sleep or lack of undisturbed sleep	57
Waiting about between trips	46
Unsatisfactory living conditions	40
Unsatisfactory ground-crew organization	28
Long working hours	28
Aircraft design	26
Irregular meals and poor food	23
Extra flying involved	20
Domestic worries	20
Lack of recreation	10

\* Figures add to more than 100 per cent, since many respondents cited more than one cause of fatigue.

This study also found that, while the men at first suffered principally from mental fatigue resulting from the unaccustomed pressure, they gradually began to suffer predominantly physical symptoms, induced not only by the work itself but also by the fact that many men had to sleep wherever they could whenever they had the opportunity.

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10. R. H. Stanbridge, "Fatigue in Aircrews" (abstract of article in Lancet, Vol. 2, No. 1, 1951), Journal of Aviation Medicine, April 1952, pp. 199-200.

Studies of U.S. crews, of which the principal one is by Lt. Colonel Harry G. Moseley of the Air Force Medical Corps, disclosed similar results, with problems of scheduling, inadequate base facilities, and domestic concerns the greatest threats to morale and the chief causes of fatigue.

The necessity of operating the airlift twenty-four hours a day and seven days a week required exhausting schedules of the individual men. Many varying schedules were tried at one time or another by different units. For the most part, crews were on duty about fourteen hours and off twelve hours. U.S. Air Force personnel maintained this schedule for three days, followed by two days of rest. For Navy personnel it went on for fifteen days, with five days off before the next round. A period of day-flying for any given crew was ordinarily followed by a period of night-flying.<sup>11</sup> RAF crews usually flew two round trips, followed by twelve hours off duty. After about two weeks of this, they were sent to Britain for five days' leave.<sup>12</sup> Toward the end of the airlift, a rotation scheme was devised for RAF crews, which called for

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11. Lt. R. D. Nauman, USN, "Medical Aspects of 'Operation Vittles'," Journal of Aviation Medicine, February, 1951, pp. 6-7.

12. British Information Services, "The Berlin Airlift," November, 1948 (11-page mimeographed release).

three months in Germany followed by two months in England.<sup>13</sup>

There were many variations in these patterns, however, since scheduling was left to squadron and group commanders, with little guidance from above, and schedules were changed frequently. Most men actually had to work more hours than their schedules called for, and were on duty at least as much time as they were off duty.<sup>14</sup> As a result, flying personnel rarely were able to get enough rest, and efficiency was cut down by fatigue and illness. To complicate matters still more, laundry, medical and post-exchange services usually were not available around the clock, and inevitably some of the men were off duty only at hours when these services were closed.

The airlift's rapid expansion strained air-base facilities for housing and feeding personnel almost to the breaking point. The water supply at Wiesbaden was inadequate at first, and Fassberg and Celle had recurrent shortages, which were bound

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13. "One Year of the Berlin Airlift," Fighting Forces, August 1949, p. 145.

14. Lt. Col. Harry G. Moseley, USAF (MC), "Medical History of the Berlin Airlift," U.S. Armed Forces Medical Journal, November, 1950, pp. 1256-57.

to interfere with personal hygiene. Inadequate mess-hall facilities, manned by untrained personnel, often created unsanitary conditions. None of the bases had proper refrigeration facilities. Only the relatively cold climate kept spoilage from becoming a major problem.<sup>15</sup>

Air personnel felt the extreme housing shortage keenly. Every type of shelter had to be exploited and even distant barracks were renovated for use. Heat and lighting were often primitive, and some dormitory rooms could hold no furniture besides double-deck bunks. Because the men were not segregated according to the shifts they worked, there was a continual traffic problem, especially in the larger rooms, and sleepers were constantly disturbed. Colonel Moseley concluded from his survey that, at their worst, conditions at the airlift bases were comparable to those found in Nazi concentration camps in 1945.<sup>16</sup>

The morale of air personnel was affected also by domestic worries and uncertainty about the future. All the men sent to

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15. Ibid.

16. Ibid., p. 1254.



Europe during the first months of the airlift had come on temporary duty, expecting to return to their home bases within weeks. As temporary duty-assignments were extended first to 60, then 90, and finally to 120 days and beyond, personnel problems multiplied. Seldom, even in wartime, had personnel been removed so abruptly and unexpectedly from their homes and communities. Some men left their families in tourists courts, others parked their cars at some airfield of embarkation, and many had to leave all kinds of legal or financial problems dangling in mid-air. As assignments were prolonged, the uncertainty and the unsolved personal problems became magnified to the point where the men could concentrate on little else.<sup>17</sup> (Morale of U.S. airlift personnel improved sharply following the establishment of a rotation plan, but this could not be put into effect until early in 1949.)

Some men were able to have their families sent to Europe after them, but even then their situation was scarcely improved. With barely enough family housing available for the regular occupation forces, airlift personnel often had to resign themselves to having their families one hundred or more miles from the airbases, and to seeing them only once or twice

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17. Ibid., pp. 1252-53.

a month, at the sacrifice of rest and sleep. One man wrote in response to a questionnaire that his family was living out of suitcases in a hotel 100 miles away from his base, and that he was anxious about the effect of the insecurity on his children. He concluded: "I feel that we have been let down by our service very badly."<sup>18</sup> The fact that many of the regular occupation personnel in Germany lived in comparative luxury did nothing to ease the situation.

#### Compensating Factors

A number of factors helped to counterbalance the physical and psychological pressures under which airlift personnel lived and worked. Most important among them were the growing spirit of competition, a sense of the importance of the job to be done, and the ability to see humor in every situation. Airlift headquarters did everything possible to strengthen these factors, one of its devices being the publication of a vigorous little daily, the Task Force Times.

Numerous observers of the operational side of the airlift have commented on the spirit of competition among the various units. In the opinion of a Navy medical officer,

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18. Ibid., p. 1255.

many aggressions were sublimated in the keen competition among the squadrons:

There was no failure on the part of our personnel to recognize the humanitarian aspect of their activities, and the international importance of the operation; but rather it seemed that the competitive aspects overshadowed the global aspects in immediate concern.<sup>19</sup>

The editor of Air Transportation, who visited most of the units engaged in flying the lift, relates his experience on coming into the operations room at Celle airbase, where an officer was shouting angrily into the phone.

"What's he yelling about?" I asked the sergeant at my elbow.

"Figures," he replied wearily.  
"Everybody's tonnage-whacky. He's claiming the tonnage high for the day. Somebody in Wiesbaden gave it to the 313th or some other group. You'd think this was the Kentucky Derby."<sup>20</sup>

The same newsman noted that the spirit of competition carried over to German workers who loaded and unloaded the planes. At Celle, the 317th Troop Carrier Group claimed a record for loading a C-54 aircraft: a 12-man German crew had stowed 19,580 pounds of coal in five minutes and 45 seconds.

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19. Nauman, op. cit., p. 11.

20. Richard Malkin, "From Hot to Cold War," Air Transportation, October, 1949, p. 11.

(The normal time for such a job was considered to be 16 minutes.) A Lt. Colonel told the inquiring editor: "Just tell loaders at other airlift bases we believe Celle loaders can't be beat."<sup>21</sup>

To some extent, morale was aided by the sense of humor with which most personnel were able to view their working conditions. The airlift was well served by two excellent cartoonists: Technical Sergeant John Schuffert, an American whose creations appeared regularly in the Task Force Times, and the British Flight Lieutenant "Frosty" Winterbottom. Their incisive caricatures became familiar to a wide audience. Jokes about the disagreeable working conditions abounded. A typical one dealt with the almost incredible mud that hampered operations at most airfields during the winter: an officer, the story went, was sloshing along through the mud at Rhein/Main airfield, when he saw a sailor's cap lying on the ground. He stopped to pick it up, and found that a sailor's head was underneath it. "What are you doing here?" asked the officer. "Everything under control, sir," replied the man. "I'm just trying to start my jeep."

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21. Ibid., p. 38.

More bitter is the humor of the "Fassberg Diary," an imaginary chronicle of half-starved, coal-blackened airmen at Fassberg Air Base. After having been on 30-day temporary duty for several years, these men, now in rags and tatters, are visited by a newspaper reporter. He is immediately pressed into service as a "replacement," the first they had ever seen. The "Fassberg Diary" was widely circulated in typescript; its unrestrained language rendered it unprintable.<sup>22</sup>

There were enough of these counterbalancing factors to keep morale from slipping to a point where operations would have been seriously hindered. But there is no denying that fatigue and poor morale prevented the fullest utilization of available personnel. Every month, 10 per cent or more of the aircrews at airlift bases had to be removed from flying, as compared to 2.5 per cent at non-airlift bases. Respiratory diseases, the most frequent cause for such removals, were five times as common at airlift as at other bases. Colonel Moseley, in his medical analysis, notes, however, that it was not unusual to assign respiratory disease as the cause for removal when the real reason was some type of subclinical fatigue.

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22. "The Valley of Taegu," an account very similar in spirit and phraseology, emerged from the Korean campaign several years later.

This seems to be corroborated by the fact that other disabilities did not appreciably exceed normal expectations.<sup>23</sup>

Colonel Moseley points out further that flying itself was not the principal cause of exhaustion, that there was indeed surprisingly little operational fatigue. In his opinion, it was the combination of other pressures that led to periodic breakdowns.<sup>24</sup>

As far as can be determined, the great stress on personnel, and consequent loss of human efficiency, did not lead to a lower performance than would have been possible had human resources been used more conservatively. In the Berlin airlift the supply of personnel was adequate to allow for some loss of human efficiency without lowering the volume of supplies transported.

The experience of the airlift suggests, however, that in situations where the fullest utilization of aircrews is a critical factor, it would be desirable to achieve greater stability in each individual's time schedule, to give him as much time as possible in which to make advance preparations, and to try to secure more adequate base facilities. Given

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23. Moseley, op. cit., pp. 1258-1261.

24. Ibid., p. 1256.

these adjustments, and the existence of a healthy spirit of competition, even very intensive peacetime flying at low altitudes does not appear to be detrimental to health or efficiency.

### Public Relations

Throughout the airlift, a handful of public information officers in the military forces did their utmost to assist newsmen in assembling material that would provide a picture of the total operation. Most of their efforts were directed toward news media in the free world, but they also gave attention to the information requirements of the German public.<sup>25</sup>

Early in the airlift, USAFE Headquarters approved a plan by which, for a period of one month, German correspondents, photographers, and radio commentators were permitted to fly aboard airlift planes, so that they might give eyewitness reports of the operation.<sup>26</sup> British authorities adopted a similar procedure, and newsmen from both West Germany and Berlin took advantage of the invitations. In addition, some of the

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25. In addition, all Allied military governments maintained offices which attempted to provide for the needs of the German mass media. In the case of U.S. Military Government, this was the Information Services Division.

26. Berlin Airlift -- A USAFE Summary, op. cit., p. 156.

airfields were occasionally thrown open to German visitors. Thus, on September 12, about 15,000 Germans, most of whom had arrived on foot or bicycle, swarmed over Wiesbaden and Rhein/Main airfields to watch the operations. An American observer described their reactions as one of "I see it but I don't believe it."<sup>27</sup> On the same day, some 150 prominent Berliners, representing government, business, schools, and welfare organizations, were invited to inspect operations at Tempelhof.<sup>28</sup> As time went on, "open house" days attracted ever larger crowds, and the airlift received ever wider coverage in the German press and radio.

The airlift's most effective contribution to public relations, however, lay in several unplanned, informal activities, all of them spontaneous gestures of friendliness on the part of Allied personnel. The most extensive of these was Operation "Little Vittles," originated by a U.S. Air Force officer, First Lieutenant Gale S. Malvorsen. In the summer of 1948, Lt. Malvorsen happened to be talking with some German children on his day off at Tempelhof. Embarrassed because he had no candy to offer them, he promised that, on his flight

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27. Task Force Times, September 13, 1948.

28. Ibid.



into Berlin the next day, he would drop some candy as he came in for a landing. His first drop consisted of a few candy bars supported by parachutes made out of pocket handkerchiefs.<sup>29</sup>

This caught the imagination of Malvorsen's former military unit, the 521st Air Transport Group, whose men undertook to supply candy and handkerchiefs in quantity from their own rations. Within a few weeks, "Little Vittles" had received so much publicity that the lieutenant was called to New York to appear on the "We the People" radio program. On his return to Rhein/Main, he found his quarters overflowing with 800 pounds of candy, 1,000 handkerchiefs, and nearly 1,000 letters and packages from military and civilian well-wishers in the United States. In addition, the "We the People" show arranged to send him 40,000 candy bars and 25,000 pieces of bubble gum. The vice president of the Huyler Candy Company offered to supply at least 10,000 more bars per week, and the wife of the company's owner undertook to provide ready-made midget parachutes.<sup>30</sup>

"Little Vittles" thus became a large operation. When Malvorsen was returned to the United States in January, his

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29. Ibid., September 9, 1948.

30. Ibid., September 27 and 28, 1948.

project was carried on, successively, by Captain Lawrence Caskey and Captain Eugene Williams. As time went on, there were further refinements. For example, every two weeks, 2,500 of Berlin's underprivileged children were invited to a camp on Peacock Island in Wannsee Lake, and the candy drop was made on the island.<sup>31</sup>

Two similar projects also received considerable publicity. The first of these was Operation Schmoo, which originated with a group of airmen at Rhein/Main airfield, who suggested the idea to cartoonist Al Capp. As a result, arrangements were made to drop approximately one hundred Schmoo balloons, to each of which was attached a card that could be exchanged for a CARE package.<sup>32</sup> The second was Operation Santa Claus, organized at Fassberg airbase by British and American personnel, who collected twenty-four tons of assorted sweets for Berlin children and flew them into the city just before Christmas of 1948.

A number of other activities, large and small, were aimed at spreading cheer among the children of Berlin and West Germany. One airlift unit adopted an orphanage. Another gave

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31. Ibid., May 18, 1949.

32. Ibid., October 14, 1948.

a series of parties for 1,300 children in the British zone. The snack bar at Gatow airfield once had to be closed temporarily because two officers had purchased all available edibles in an attempt to feed a crowd of hungry-looking children. Few, if any, of these ventures were conceived as public relations gestures. Yet, in terms of publicity and good will, their effect was appreciable.

The Berlin airlift thus offers a number of illustrations of the important contribution that individual enthusiasm, energy, ingenuity, understanding, and humanitarianism can make to a large-scale operation. It also suggests that human limitations should be taken into account, along with the capacities of machines and other physical or organizational factors. One of the principal problems in planning such an operation is certainly to allow for human limitations, while at the same time providing full scope for the unfolding of both suspected and unsuspected human capabilities.